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*A. J. Cunningham
Col. M.C.*

Report of 12th
Fracture - Orthopedic Conference

22 & 23 November 1943

Regional Fracture Orthopedic
Conference Air Force
Regional Hospital
Regional Fracture Orthopedic Conference Air Force
Regional Hospital

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FOR E W O R D

The papers presented at the Regional Fracture - Orthopedic Conference, held at Army Air Force Convalescent Center and Station Hospital, Mitchel Field, New York, on 22 and 23 November 1943, have been compiled in this booklet. An attempt has been made to include the main subject matter of each paper and the essential points of each discussion. Because of the length of the detailed proceedings of the meeting, it was found inadvisable to attempt to present a verbatim report.

It is hoped that the important portions of each contribution to the Conference have been included. If any parts of the papers or discussions have been inadvertently omitted, or misstated, we should like to ask your forbearance.

O. K. NIESS,
Colonel, M.C.
Surgeon, AAF
Convalescent Center and
Regional Station Hospital,
Mitchel Field, N. Y.

434280

CUTLINE OF OBJECTIVES OF MEETING

BY

LT. COLONEL ALFRED R. SHANDS, JR.

LT. COL. ALFRED R. SHANDS, JR. (Air Surgeon's Office) These meetings were planned to bring together the Medical Officers of the Air Forces and Ground Forces who are responsible for the care of fractures and orthopedic surgery. While attending the other conferences throughout the country he had gleaned a great deal of information about what the other fellow is doing. During the course of the meeting he would comment on the different forms of treatment and the experiences as discussed at these conferences. There were a great many ways of doing things in the practice of medicine, and through long years of experience in the Army it has been found that certain methods bring better results than others. The hope is that those attending would take away from the meeting methods of treatment and care that have been proven to give the maximum results to the greatest number of soldiers. Many men enter the Service with set ways of treating fractures and of approaching orthopedic problems. Experience in the Army has shown that the individual has to submerge his own ideas and thoughts and accept the method that is best for the greatest number. The main objective for these conferences was to stabilize methods of care by pointing out these best methods and he hoped this would be accomplished at this meeting. A few do's and don'ts of fractures have been prepared, with which some or many of the officers would not agree; if they did not agree, he hoped they would express their opinion and argue their point. The best part of the meetings held so far has been the discussions. The papers have formerly been good and prepared

with a great deal of thought, but usually in the discussions when the man gets up to discuss a point, he tells what he is doing in a spontaneous manner. The discussions have been free and frank in all previous meetings and he hoped this meeting would be the same. He welcomed the members in charge of orthopedics from the Ground Section and wished they would consider that it was as much their meeting as it was a meeting of the Air Force. He was glad they had consented to be on the program and hoped they would enter the discussions freely. Another objective of these meetings was to establish responsibility for the care of orthopedic and fracture patients in the Air Force hospitals; he hoped that after these meetings there will be a regional consultant system which will make it possible for every station hospital to have good orthopedic consultants readily available. There has already been a scheme worked out on paper awaiting authorization which should soon be in operation. He said he would have something to say about each paper and the discussions following. He did not want anyone to leave with wrong impressions as to what could or could not be done in our hospitals and that he was reserving the right to tell the other fellow whether he is right or wrong on this question.

COMMENTS ON THE PROGRAM OF MEDICAL
SERVICES IN THE ARMY AIR FORCES

BY

COLONEL WILLIAM P. HOLBROOK

COLONEL WILLIAM P. HOLBROOK (Air Surgeon's Office) conveyed to the conference greetings from General Grant and the latter's deep appreciation for the hard work that had been put in during the past year, and particularly the recent efforts in the arranging and organizing of the Conference. He went on to briefly review the history of the Medical Service of the Air Forces. He mentioned that in the Spring of 1942 there were very few doctors and hospitals when the big push came after Pearl Harbor. He said that during the year 1942 over 9,000 physicians volunteered for Air Force Service and were organized and assigned. There were over 200 hospitals built, established, staffed and otherwise organized in 1942, so that at the present time the Air Force Medical set-up consists of 250 hospitals and over 10,000 medical officers. The goal of the Medical Service of the Air Force is to raise the level of the professional service to the highest possible level. Approximately 60 hospitals have been approved by the American Medical Association and the American College of Surgeons for residences in Medicine and Surgery. It means a great deal from the standpoint of Medical care, when the American Medical Association approves of something unique in military medicine. He said that those who saw the last official list should be pleased with the approval of the AAF Hospitals. In these residences the hospitals aim to keep up the stimulus of teaching medicine as well as performing the routine medical work. There are now 600 to 700 youngsters who have come into these residencies having completed their orientation at Carlisle. These residencies are

approved for securing credit for the different specialty boards. Credit is given for a period of 6 months to a year. The plan is that the upper third of the resident group will be given the privilege of staying a full year or of going to the School of Aviation Medicine. Colonel Holbrook stated that the men were hand-picked and that a resident of high calibre was as good as two Medical Officers. He said that this resident program had been received with great enthusiasm because it is stimulating to the staff of a hospital to be responsible for teaching. As a result the level of medical care has very definitely risen and will be maintained. General Grant asked Colonel Holbrook to call the attention of the conference to the recent letter sent out by General Arnold detailing that all arms and services with the Air Force will shortly be wearing wings instead of the insignia of the different Armed Services.

FRACTURES OF THE HAND AND WRIST

BY

CAPTAIN EDWARD J. COUGHLIN, JR.

CAPTAIN EDWARD J. COUGHLIN, JR. (Station Hospital, Grenier Field, N.H.) reviewed a series of 100 consecutive fractures of the hand and wrist, which were treated for the most part by conservative methods, an outline of which follows:

Phalanges were treated conservatively with splints, however, in cases having dislocation, skeletal traction was applied for ten days and early motion instituted. He cites two baseball finger fractures treated by open reduction and wire suture technique, with good functional results. In his cases, Bennett's fracture treated by early active motion and early use of the hand, seemed to give as good results as with cast traction and abduction method of treatment. He states he has had very good functional and cosmetic end results of fractured metacarpals, treated by transfixing the fragments by Kirschner wire, as described by Waugh. In his hands, metacarpomultangular arthrodesis has given a good result in an old Bennett's fracture which incapacitated the hand. He has had a series of 14 fractures of the navicular bone, all treated by plaster, with the hand radially deviated and slight dorsi flexion and wide abduction of the thumb. All 12 acute fractures of the navicular bone healed. Two old ununited fractures of the navicular lacked sufficient symptoms to warrant operative interference.

Colles fracture was encountered only three times. Captain Coughlin preferred local anesthesia, manipulation under the fluoroscope, and fixation by sugar-tong splint. He maintains palmar flexion and ulnar deviation for 10 to 14 days and initiates physiotherapy at 10 days.

DISCUSSION

MAJOR WAYNE R. GLOCK (Mitchel Field, N.Y.) considered Bennett's fracture, navicular fractures and comminuted impacted Colles fractures the chief problems in this area. He stressed the importance of careful and repeated search for Bennett's and navicular fractures. He prefers to use the orthodox skeletal traction abduction cast method of treatment for Bennett's fractures. Major Glock prefers to maintain fixation, of comminuted, or impacted Colles fractures in strong palmar flexion and ulnar deviation for six weeks.

LT. COLONEL ALFRED R. SHANDS, JR. (Air Surgeon's Office) emphasized the problem of fractures of the hand and wrist, citing a frequency of 20 to 48% of all fractures seen in the Army Air Force following in this group. In his opinion, the end results of open operation on phalanges and baseball fingers are uniformly bad. He finds Bennett's fractures common in the Air Force and prefers to treat them in the orthodox fashion, with abduction, skeletal traction by towel clips, or, by wire in abduction cast. Colonel Shands reviewed a wide variety of methods of treatment of metacarpals and carpals. He prefers general anesthesia when reducing Colles fractures. He feels that fractured naviculars are treated uniformly well in the Army Air Force.

MAJOR ARTHUR A. THIBODEAU (Fort Devens, Mass.) discussed fractures of the phalanges, but was discouraged with open operation on the phalanges, resorting occasionally to arthrodesis for painful joints. He states he has had poor results with bone grafting in ununited carpal scaphoid fractures.

This paper was further discussed by Lt.
COLONEL JOHN C. ECHELS (Camp Edwards, Mass.)
LT. COLONEL ALFRED R. SHANDS, JR., MAJOR
STUART Z. HAWKES, (Mitchel Field, N.Y.) LT.
COLONEL ALEXANDER MILLER (Fort Dix, N.J.)
MAJOR NOLAN H. BAIRD (Fort Devens, Mass.)
and CAPTAIN EDWARD J. COUGHLIN, JR.

FRACTURES OF THE UPPER ARM, ELBOW AND
FOREARM FRACTURES OF HUMERUS SHAFT

BY

MAJOR SPENCER T. SNEDECOR

(Valley Forge General Hospital,
Phoenixville, Pa.)

TYPES:

Transverse - by twisting force

Spiral - by angulating force

LOCATION:

1. Above Pectoralis insertion

The upper fragment is abducted
by supraspinatus.

2. Below pectoralis insertion

The upper fragment is adducted
by pectoralis.

3. Below deltoid insertion - common
type.

The upper fragment is abducted
by deltoid.

REDUCTION:

Traction and manipulation - often without
anesthesia.

Too much relaxation makes it
difficult to hold in alignment.

(Not much traction needed.)

Slight angulation or shortening
permissible.

Immobilization:

1. "Hanging" plaster cast.

2. Axillary pad or triangle,
with arm strapped to chest.

3. Plaster splints - may go up
over shoulders or form a U
around flexed elbow.

4. Shoulder spica or abduction frame.

COMPLICATIONS:

Musculo - spiral paralysis.

UNION:

Five to eight weeks.

If delayed, requires better immobilization, or open reduction.

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FRACTURES ABOUT ELBOW

TYPES: (Omitting childhood supracondylar and epiphyseal fractures.)

1. Intercondylar T or Y. By direct violence or car window smash.

Reduction: 1. Manipulation and plaster splints; elbow flexed.

2. Traction suspension across chest with wire through olecranon. Early active motion.

- II Internal or external condyle. By a twist of the elbow.

Reduction: 1. Manipulation and immobilization at angle where fragment remains in position - usually flexion. Plaster splints. Tricky. If not well reduced or if fragment is rotated must do-

2. Open reduction and fixation with silk, wire or screw.

- III. Head of Radius - By a fall on outstretched hand.

Reduction: 1. Minimum displacement.

Sling. Early active motion.

2. Displaced fragments.

Reduction by early open operation and removal of head and neck. Early active motion.

IV Olecranon. Direct or muscular violence.

Reduction: 1. If no separation, immobilize with plaster splints in extension.

2. If separated-open reduction and fixation by wire.

Plaster at 90°.

V Fracture dislocations. By fall on hand with elbow partially flexed.

1. Simple dislocation (unla posterior)

Reduction by traction and extension. Support in sling. Early active exercise.

2. Dislocation plus fracture of coronoid.

Reduction of dislocation. Removal of fragment by open operation if of any size.

3. Dislocation plus fracture of head of radius.

Reduction of dislocation. Fracture of head of radius as described before.

4. Dislocation plus fracture of the capitellum.

Reduction: A. Manipulation and plaster splints fixation - usually requires-

B. Open operation to replace fragment or remove it.

5. Dislocation of head of radius anterior with fracture upper third of ulna. Monteggia fracture.

Reduction of dislocation by open operation, repair of orbicular ligament if torn and fixation of ulna fragments with plate.

FOREARM

TYPES:

I Radius

II Ulna

III Both bones

By angulating force on forearm.

Reduction: 1. Manipulation and immobilization in sugar tong plaster

splints or circular cast. Reduction satisfactory if 2/3 end to end. Angulation most troublesome. Will result in limitation of pronation and supination. Takes place in plaster. Tighten dressing often. Immobilize elbow.

Fracture of only one bone means injury to one of the radio-ulnar joints.

Unite slowly. 10 weeks.

If reduction cannot be obtained-

2. Open operation and rigid fixation with four screw plates.

DISCUSSION

LT. COLONEL JOHN C. ECHELS (Camp Edwards Mass.) was glad to hear of the hanging cast results in traction suspension treatment in fractures of the internal & external condyle. He was speaking of the more severe types of condylar fractures and if it is only a chip off the condyle, Captain Coughlin's method of putting it in a sling and giving early motion gives best results. He could not emphasize too strongly that elbow fractures should have early motion, at the expense of anatomical position- if necessary. In reviewing some of his cases, out of 30 cases of fractures of the head of

the radius, they got them out of the hospital to duty in an average of 31 days for the closed cases, and an average of 52 days for those who had to have some surgery. It was very noticeable that those who got the best results were those who had motion started as early as the fifth day, never later than two weeks. He feels sure that those who have dislocations and fractures about the elbow and shoulder should have motion within 6 to 10 days.

MAJOR REGINALD C. FARROW (Butler, Pa.) Emphasized that unless x-rays taken very early and properly the important lesion is likely to be missed. He cited two cases, in one, the original x-rays failed to show dislocation of the elbow, because they did not get a true lateral. In the second case, the man was injured in Africa, a dislocation of the upper end of the ulna was treated unsuccessfully. Months afterward, it was found he had a dislocation of the head of the radius which had been persistent all the time.

MAJOR GEORGE K. CARPENTER (Staten Island, N.Y.) Suggested open reduction for both bones of the shaft when cannot get perfect reduction. They heal slowly; if angulation, get limitation of pronation and supination. If plating is done early, the time element is certainly reduced.

CAPTAIN EDWARD J. COUGHLIN, JR., (Grenier Field, N.H.) Asked if head of radius fractures were cases to be operated on immediately, also, whether sulfanilamide was placed in the wound.

LT. COLONEL JOHN C. ECHELS (Camp Edwards, Mass.) stated that operation on ninth day best and no sulfanilamide placed in wound.

MAJOR GEORGE K. CARPENTER (Staten Island, N.Y.) Believed the best time to remove the head of the radius is the first day. The only reason they did not operate on some early was because they did not see the patient early enough. When sulfanilamide used in the wound, there is no effort at callus formation.

LT. COLONEL ALFRED R. SHANDS, JR. (Air Surgeon's Office) Said that cases were being reported on which radial palsy came on after a hanging cast; however, he was very enthusiastic about its use. A way of controlling the traction force in a hanging cast if by putting on very light plaster and incorporating a shot bag at the elbow to which weight can be added or subtracted. With frequent x-ray there ought not to be any difficulty with distraction which is so often followed by a disastrous non-union. There should not be a condemnation of the method as a whole when it is found it is incorrectly used.

He stated that there was no one operative method or time to advocate for treatment of fractures of the elbow when indicated. He agreed that if the elbow was to be operated on it should be done as an emergency, and should not be delayed. If you have to delay, wait four or five weeks to give the new bone a chance to form although, of course, this should be varied according to the case at hand. The question of fractures of the head of the radius is disturbing everyone. Early motion is definitely indicated without immobilization for those fractures of the head of the radius which do not require an open reduction. He commented on the reports of excising the head of the radius with resulting deformity and pain in the wrist.

FRACTURES AND DISLOCATIONS OF
THE SHOULDER GIRDLE
BY

MAJOR REGINALD C. FARROW, M.C.

MAJOR REGINALD C. FARROW, M.C. (Deshon General Hospital, Butler, Pa.) presented a detailed review of the osteology and syn-desmology of the shoulder girdle showing the integral function and anatomical relationship of each component. Following injury, the shoulder joint is liable to severe limitation of mobility. To him, restoration of full range of motion is the chief index of length of disability.

In discussing acromio-clavicular separation, the author has described the forces causing this injury and brings to attention that there are two types of separation, namely, a simple subluxation of the joint by virtue of injury to the acromio-clavicular ligaments, and the second and more important, a subluxation attended by both tearing of the acromio-clavicular ligament and the coraco-clavicular ligament. He feels that the ligamentous injuries are very slow to heal in this area and prefers to treat them by shoulder spica abduction casts for six to eight weeks, although he has discussed all of the accepted methods of treatment.

Dislocation of the shoulder (humero-scapular joint) was discussed as to the different forces producing the various types of deformity. He emphasizes the importance of obtaining x-ray studies for official record of the injury, and to note bony complications. He disagrees with the prevalent concept that dislocation of the shoulder is a relatively benign lesion. He cites the numerous and frequent complications and urges the

surgeon to look for associated fractures of the greater tuberosity of the humerus, fracture of the glenoid, injury to the circumflex nerve, fracture of the surgical neck of the humerus, fracture of the coracoid, lesser tuberosity, anatomic neck and vascular injury.

The standard methods of reduction of dislocated shoulder were discussed briefly. A detailed description of a "3-sheet" method was given as a gentle reliable atraumatic procedure. His post-reduction management consists of Velpau bandage one-two weeks and a sling for two-three weeks, and guarded exercise avoiding abduction beyond 90 degrees. Complicating fractures and other injuries may be treated after it is safe to abduct the shoulder to 90 degrees.

Frequently histories on recurrent dislocation are not too conclusive, and the term dislocation crops up when it should not be applied. Where primary operative procedures have failed, further surgery in the army is not advisable.

The author discussed fractures of the clavicle as to the etiology, mechanism producing the deformity and the forces necessary to maintain reduction. He described all acceptable methods of treatment, being especially favorable to the use of figure of eight plaster bandage.

Dislocation of the sterno-clavicular joint is produced by tearing of the sterno-clavicular ligaments. The treatment is essentially a large felt pressure pad and adhesive pressure bandage applied for six-eight weeks. Here maintenance of reduction is precarious and, if unsuccessful, open reduction and fixation is considered.

In fracture of the body of the scapula there is an associated hemotoma formation which may cause limitation of motion by adhesions to the chest wall. It has been shown that a sling, axillary pad and circular body bandage for several days, followed by early motion and physiotherapy is sufficient treatment. The distal fragments of fracture of the neck of the scapula are displaced downward and medially, and treatment requires the reverse of these forces. He favors recumbent treatment with the arm in traction in abduction with the elbow flexed 90 degrees. The fixation can be discontinued at the end of three weeks, when baking, massage, and active exercise can be started, and an arm sling worn until five weeks after injury.

Fractures of the humerus near the shoulder were discussed as to the types of angulation and deformity and mechanism of production. As to treatment, he advocates conservative treatment and relaxed pendulum exercises, and early mobilization of the shoulder joint.

In conclusion the author advocates (1) the maintenance of adequate x-ray control in these injuries. In almost all of them, the methods of fixation are not universally dependable, and loss of position of fragments, or parts of a joint, is a constant possibility, and can usually be discovered only by x-ray examination; (2) frequent inspection of the bandages, and frequent adjusting, both for comfort and efficiency. Adhesive tape needs reinforcement and replacement. Roller type bandage needs re-wrapping; (3) the beginning of active motion of the shoulder at the earliest moment that is practical. A period of fixation unnecessarily long may mean prolonged disability.

DISCUSSION

CAPTAIN SPENCER FLO (Bolling Field, Wash., D.C.) reemphasized the importance of explicit instructions as to obtaining x-ray studies in acromic-clavicular separation, as this deformity is not apparent with the patient recumbent. He agrees with the essayist that the best method of treatment of fracture of the clavicle is the figure of eight plaster bandage. He cited cases of several types of injuries to the shoulder where unnecessarily long immobilization of the shoulder has resulted in prolonged disability.

LT. COLONEL ALEXANDER MILLER (Fort Dix, N.J.) was of the opinion that the Kocher maneuver, for reduction of dislocation of the shoulder joint, was not the best form of treatment. He prefers to use the Hippocratic method, or of traction with the arm in extension and full elevation. With either of the latter methods, rotation of the arm is not necessary and most cases need no anesthesia. He has never seen recurrent dislocation of the shoulder joint where there has been deltoid paralysis. By using a webbing figure of eight around the chest and arm it is possible to continue use of the arm after reduction and still prevent recurrences.

DR. PHILIP WILSON (Hospital for Ruptured and Crippled, NYC) has found that sterno-clavicular dislocation is a serious injury, quite often overlooked because of swelling in the area. Most cases cause an annoying clicking in the neck or shoulder, but few can even displace the clavicle inward sufficiently to cause pressure on the trachea.

For chronic symptomatic dislocation of the acromic-clavicular joint the fascial repair from the coracoid to the clavicle and acromic-clavicular ligaments becomes calcified, so it is most expedient to resect the outer end. It is quite possible to repair the severed axillary nerves now and he urges investigation of the nerve if they not promptly regain function.

MAJOR ARTHUR A. THIBODEAU (Fort Devens, Mass.) reports seeing twelve soldiers who were unable to carry a gun because of pain or deformity following fracture of the clavicle. He has also seen six non-unions of fractured clavicles in 1943 and believes in a longer period of fixation, i.e., six weeks, and treats his cases with a plaster vest.

LT. COLONEL ALFRED R. SHANDS, JR. (Air Surgeon's Office) reviewed all conservative methods of treatment of acromio-clavicular separation, and in detail discussed the traction cast method, which consists of a heavy cast about the chest and involved arm having webbing, or strap or elastic traction band passing over the shoulder depressing the outer end of the clavicle. He discussed the fixation of the acromio-clavicular joint with Kirschner wires. The end results of acromic-clavicular separation have not been uniformly good. From a broad survey of camps through the country there were generally 15% bad results from use of the Nicola operation in recurrent dislocation of the shoulder. The Bankhart operation does not leave a shoulder joint which is capable of full military duty.

This paper was further discussed by COLONEL WILLIS LASHER (West Point, N.Y.), Lt. COLONEL ALFRED R. SHANDS, JR. (Air Surgeon's Office), COMMANDER HUDSON (St. Albans, N.Y.)

MAJOR STUART Z. HAWKES (Mitchel Field, N.Y.)
and closed by MAJOR REGINALD C. FARROW,
(Butier, Pa.)

FRACTURES OF THE LEG AND ANKLE

BY

MAJOR GEORGE K. CARPENTER

MAJOR GEORGE K. CARPENTER (Halloran General Hospital, Station Island, N.Y.). The large majority of shaft fractures and fractures of the lower extremity of the tibia and fibula with joint involvement, may be reduced under anesthesia and efficiently fixed by the application of a plaster of Paris cast. The reduction should be accomplished at the earliest possible moment, preferably before the initial swelling occurs. If swelling has already taken place, do not wait until it subsides, for reduction and fixation is the best treatment of swelling when displacement of the fragments is present. Anesthesia is always indicated in order to obtain relief of pain and relaxation of muscle spasm. General, intravenous, spinal, local infiltration, or nerve block anesthesia is permissible. Reduction under the fluoroscope is rarely if ever necessary or advisable.

Post-reduction x-rays should be made in both views after the plaster cast hardens and x-rays should be repeated at frequent intervals.

Certain types of fractures of the tibia and fibula will be difficult to retain should it be possible to reduce the fracture. This type of fracture should be treated by an operative procedure at the earliest possible moment. If the patient must be transferred to another hospital, the fracture should be adequately splinted, preferably in a bivalved plaster cast, before the patient is moved. Oblique fractures of the lower middle third and upper distal third of the tibial shaft, especially if unaccompanied by a fibula fracture, are difficult to reduce. Even if such a fracture is reduced, the position can rarely be maintained until the fracture has united by either a padded or unpadded cast.

These fractures are easily reduced by an open operation and internal fixation should be employed by the use of a plate or in certain cases, by the application of screws. Needless to state, the reduction should be anatomically perfect and the fixation must be positive. Comminuted fractures of the tibial shaft, especially those presenting rotation of a two to four inch comminuted portion of the shaft, are often very difficult to reduce without an open operation, and are as a rule better treated by open reduction and internal fixation.

External fixation in the treatment of fractures of the shaft of the tibia and fibula is a valuable adjunct in treatment. If it is to be used, the two pin method and not a single pin in either fragment, should be employed. If a single pin is used in the upper tibia and a second single pin in the lower tibia and the fracture reduced by a mechanical apparatus, the pins must be incorporated in the plaster cast. This method will not always prevent displacement in the antero-posterior diameter and when the plaster dries, it expands, and distraction is often produced. Distraction is a frequent cause of delayed union and non-union. When using external fixation, two pins should be placed through the upper extremity of the tibia and two pins through the lower extremity of the tibia. These pins may merely pass through either cortex and not through the soft structures on the opposite side of the leg. The pins are fixed and reduction maintained by the application of adjustable bars and if the apparatus is then included in plaster, distraction cannot take place. This method of treatment as a rule calls for fluoroscopic or x-ray examinations in the operating room in order to determine adequate reduction. Internal fixation by plate or screws by an open operation in the hands of a skilled surgeon, is just as safe and as rapid a procedure as the method of external fixation. The former procedure will be safer and the end result will be union and restored function at just as early

or an earlier date. -

External fixation by the double pin method has a definite place in the treatment of fractures of the tibial shaft, but its use should be limited to selected cases. The patient with a tibial fracture treated by external fixation, who becomes submerged in water, is better off than the patient whose fracture had been treated by plaster cast. Its greatest field of usefulness is in the group of compound fractures of the tibia which cannot be treated by internal fixation, for then the fracture may be treated as an open wound while reduction is being efficiently maintained by external fixation. The writer does not recommend this procedure, nor does he use external fixation in any form.

Early walking should not be permitted until the check-up x-rays show position has been maintained and the fracture has partial union. An unpadded cast may then be applied and weight bearing permitted. Just when the fracture becomes ready for weight bearing, depends upon the anatomical location of the fracture and the many other factors which influence bone healing. The x-ray finding and not the calendar, should determine when walking may be started, and likewise, the x-rays will decide when support can be omitted. Naturally, a simple transverse fracture which has been perfectly reduced and well fixed in an effectual cast, may advantageously begin weight bearing almost immediately and certainly before union is firm. Mobility at the site of fracture must be accepted as a very frequent cause for delayed or non-union. Early weight bearing, physical therapy, and rehabilitation are invaluable as an adjunct in treatment, but these procedures must be so directed as not to encourage loss of position or mobility before the fracture unites. The advantages of early knee and ankle motion, and earlier weight bearing which are considered indications for external fixation, are imaginary and not real. With adequate internal fixation, motion may be instituted

soon enough to bring about function by the time the fracture has united sufficiently to discontinue support. Early weight bearing to hasten union, may be a fallacy, for weight bearing before the fracture becomes united, will cause mobility at the site of fracture in many cases, and in consequence, delayed union and non-union may result. Weight bearing after the fracture partially unites will unquestionably hasten the final union.

Fractures of the tibia which extend into the ankle joint, call for as nearly a perfect anatomical reduction as it is possible to obtain. The usual fracture of this type may be adequately reduced under anesthesia by the closed method. The reduction may be retained by the application of a well fitted plaster of Paris cast. If a nearly perfect anatomical reduction cannot be effected, the fracture should be reduced by an operative procedure and as a rule, internal fixation is employed to maintain reduction. The patient's age or general condition may be such that an operation in the case needing open reduction, is not justified, in which event, a closed reduction must be done. If the reduction is not good, a traumatic arthritis may subsequently develop. The pain and disability may continue to such a degree as to justify a fusion of the ankle joint at a time when the patient's general condition will tolerate major surgery. A fusion of the ankle joint, however, should not be performed too soon, as occasionally the pain ceases and even a spontaneous fusion will sometimes occur. Severely comminuted fractures of the distal extremity of the tibia, and particularly when associated with astragalus fractures, require early fusion in the correct position for ankylosis.

A treatise on fractures of the leg and ankle, calls for some consideration of the compound fracture. The important consider-

ation now is how the fracture may be safely treated under the existing circumstances and not what the treatment would be in one of our civilian hospitals. At Halloran General Hospital, where many compound fractures are evacuated from overseas, it has been possible to evaluate the type of treatment which has as a whole seemed to have effected the best results: Effectual and early splinting and the judicious administration of morphine has done much to reduce shock and lessen soft tissue trauma. Blood plasma and blood transfusions have further reduced shock and saved many lives. Transfusions should be given early when indicated, and certainly blood plasma will not suffice in the more severe cases, particularly when there has been much loss of blood. Sulfonamides administered early and in adequate dosage, both locally and systematically, have unquestionably served as a very beneficial adjunct in treatment. A prompt and careful debridement is an absolute essential. All foreign bodies and devitalized structures should be removed and considerable discretion should be exercised in determining the completeness of the debridement. A too radical debridement is to be avoided. The wound should be thoroughly cleansed and irrigated before, during, and after the debridement. The fracture is then reduced, but in the battle casualty, neither internal or external fixation should be used. The wound should never be closed. Vaseline gauze should be used to protect the wound, but it must not plug the wound sufficiently to interfere with drainage should infection subsequently develop. Reduction is then maintained by the application of a padded and well fitted plaster cast. All of these dictates of treatment must be strictly adhered to if the incidence of pyogenic infection and gas gangrene is to be minimized. The severe septic compound fractures of the leg which have been evacuated to our hospital, have as a rule been those who were injured where it was impossible

to apply all of the described treatment. The large majority of cases thus treated have returned with clean wounds and satisfactory reductions. They usually progress to complete healing within the normal time limits.

DISCUSSION

MAJOR NOLAN H. BAIRD (Fort Devens, Mass.) wished to stress some of the points brought up by Major Carpenter. Important thing in reduction of fracture and trying to maintain it with traction is in maintenance of traction, during application of plaster cast, until it hardens. Fracture often slips and no check-up x-rays are taken. On the question of skin-tight cast, he agreed with Major Carpenter. He felt skin-tight casts had been used too much. British Medical Corps completely condemned skin tight casts in North Africa. To use it, one needs a lot of experience. Bivalved casts can be used with little danger. They should be bandaged tight; they will not disturb circulation. Also people often forget flexion of the knee, not done enough. It was interesting to him to hear Major Carpenter mention the section cast. There are cases when it can be used but one needs a lot of experience. Many probably have not seen them enough. As to callus formation, one has to use one's own judgement for one has to wait a long time for roentgenologists to tell that the fracture is healed. One of the surest signs of healed fracture is lack of pain on weight bearing. Repeated x-rays should be done. One should compromise between own judgement and that of roentgenologists. Some men try to treat oblique fractures of lower third of tibia with plaster. He does not think it can be done because the muscle pull will shorten and slip; it is only good for temporary treatment. One thing not mentioned in Major Carpenter's paper was the badly comminuted

fracture where the lower third of the tibia can be treated with Boehler frame, with a pin through the oscalcis. One can maintain traction and it is a rather simple procedure, putting a pin through the calcaneus. There is not much use for this method in the combat lines or areas. If motion is used too early after plating, one is likely to get breaking of the plates and screws with bowing and angulation. In fractures of the ankle joint, it is very important to get, if possible, complete anatomical reduction and also, if possible, to get it at the first attempt. Another thing that one sometimes slips by, is that fact that one does not pay enough attention to the mortice of the joint. Men in the Army see much traumatic arthritis brought on by not realigning the mortice; as a result, the man is not of much use to the service. It should be completely reduced, plaster can be molded around both malleoli without loss of flexion. It should also be molded around the arch of the foot. This should be put in dorsi flexion. If you can put the foot in fixed dorsi flexion, it can be maintained.

DR. PHILIP WILSON (New York City) said in reference to compound fractures, they might be interested in a communication from a surgeon in North Africa, who has done primary plating through separate incisions in a compound wound. Throughout the theater of North Africa most of the men have tried this method on one or two cases. They have all gotten away with it, giving oral sulfadiazine and, or, local sulfanilamide. Out of twelve cases, one healed per primum; the others healed with granulation tissue. However, you cannot get away with this often enough to justify its use; should avoid the risk. He also feels that the sulfanilamides are helping but cannot do the whole job; not enough penicillin to go around. He agrees with Major Carpenter on skeletal fixation versus internal fixation. His experience with external fixation is that

it is still a difficult procedure. A fixed reduction takes just about as long as doing internal procedure. The trouble is that it looks so easy one does not realize the difficulties.

LT. COLONEL ALFRED R. SHANDS, JR. (Air Surgeon's Office) said that at the Spokane fracture meeting one of the surgeons reported that in his hospital on Bataan, at times, 5 to 6% of the total patients were compound fractures with complicating gas bacillus infection with a mortality rate of only 1%. There should be no temporizing with gas infected wounds; the parts should be split open immediately. It is predicted that when the troops get into Italy we will see much more gas than seen in Africa. The Surgeon General is very much opposed to skin tight plaster. He should like to ask Major Carpenter if he has seen the disability from traction by Steinman pin in the oscalcis of pain in the substrangular joint. There has been no discussion about the use of arch supports in starting to walk after fractures of the ankle. Do not forget to support the arch.

MAJOR GEORGE K. CARPENTER (Halloran General Hospital, Staten Island, N.Y.) Badly comminuted fractures of the lower third of the tibia have been treated by skeletal traction on a Bohler splint as recommended by Major Baird, but the method is not employed as frequently as it was formerly used. Sulphonamide therapy has been a valuable adjunct in the treatment of compound fractures. Early active motion is much more valuable in the restoration of function than early passive motion. A fracture should not be removed from the cast for the purpose of early motion until union is firm. Compound fractures in the combat zones are treated by early debridement, but occasionally certain unpreventable circumstances make it impossible to do the job early. The primary clean-up may be handicapped by a limited supply of water. These cases must often be evacuated at a moment's

notice which is all the more reason why the wounds should never be closed. Early in the war, in certain combat areas, an occasional compound fracture was closed before General Kirk pointed out the dangers of such a procedure. It is not being done any more. Very few cases of gangrene have been encountered and this is attributed to adequate treatment, but then too, the major fighting to date, has not taken place where the soil predisposed gas infection. In summarizing; fractures of the tibia should be treated very conservatively, but when the job is impossible by conservative measures, then a radical enough job should be done.

DIAGNOSIS AND TREATMENT OF INTERNAL
DERANGEMENTS OF THE KNEE
BY
DR. ARTHUR KRIDA

PROFESSOR ARTHUR KRIDA (New York University Medical College, NYC) defines internal derangement of the knee joint as a term that is applied to one or more of a series of painful happenings in which the knee becomes mechanically blocked by an abnormal mass or tissue lying within it which for the time impinges upon the articulating surfaces.

The two commonest causes of internal derangement are injuries to the semilunar cartilages and free osteo-cartilaginous bodies, the latter the result of a process called osteochondritis dessicans. Lesions of the semilunar cartilages occur commonly by twisting traumas of the knee joint. The free osteo-cartilaginous body is thought to result from direct trauma and subsequent aseptic necrosis.

It is shown by Dr. Krida that effusion mildly restricts motion; the restriction, however, is elastic and not rigid as occasioned by interposition of torn cartilage or free osteo-cartilaginous body.

It is important to test the knee joint for abnormal mobility, type of restriction of motion, points of maximum or localized tenderness, gross abnormalities of contour, or of crepitation on motion of the knee. The locked knee presents a striking and characteristic picture. The joint seems to be rigidly held in an angle of variable flexion and any attempt to straighten it is strongly resisted by muscle spasm and pain. Only by x-ray can a full osteo-cartilaginous body be differentiated from a semilunar cartilage displacement.

Primary injuries should be treated conservatively, as tears of the circumference of the cartilage may heal. Dr. Krida stresses greatly that in the acute phase the exudate consists of hemorrhage and should be carefully aspirated to prevent adhesions. The joint should then be rested for at least two weeks. Most knees will unlock spontaneously with rest and aspiration, however a few will require manipulation. Rarely is operation necessary for relief of primary locking.

The chief indication for arthrotomy for excision of a semilunar cartilage, or removal of free osteo-cartilaginous body, is the history of recurrence of locking. A free osteo-cartilaginous body demonstrated by x-rays to lie in a "silent" portion of the joint should not be removed unless it becomes the cause of mechanical obstruction.

Dr. Krida prefers to use the Jones incision and removes only the torn portion of the cartilage. The cartilaginous tears should always be demonstrated and the other semilunar cartilage inspected. The parapatellar incision may be used when wider exposure is necessary. He also advocates large, voluminous dressings partially immobilizing the joint for five days. He allows the patient to develop motion on his own initiative and permits weight-bearing after ten to fourteen days, with support. The patient is encouraged to develop the quadriceps muscle by exercise.

DISCUSSION

COLONEL WILLIS LASHER (West Point, N.Y.) reviewed his experience of treating and observing 200 cases of knee injuries. He has only seen one case without effusion. He asserts that the hemorrhagic fluid should be completely aspirated by large gauge needle. Repeated

locking with attendant hemorrhage into the joint was the chief indication for operation, and at West Point primary injuries were treated conservatively unless locking persisted. He discussed the complex problems caused by these injuries to the Cadets, in regard to time lost, receiving commissions, advisability of operations, and later, qualifications for flying. He feels that the end results are in direct proportion to the cooperation of the patient. In his opinion, torn cartilages did not heal and that all bona fide tears led to ultimate surgery.

Colonel Lasher cited one case of cruciate ligament injury causing abnormal antero-posterior motion of the knee joint resulting in separation from the service, yet this man was able to play professional football!

A case of complete dislocation of the knee joint without fracture was presented with slides and x-ray.

LT. COLONEL ALFRED R. SHANDS, JR. (Air Surgeon's Office) discussed the parapatellar incision originated by Dr. Krida. In a survey of many fields where this incision was used indiscriminately, the results were poor. He illustrated the psychological disadvantage of the attending long scar. It is observed that aviation cadets recover from knee injuries twice as fast as G.I. soldiers. The consensus is that following knee operations the patients are not capable of full military duty for at least eight weeks. Colonel Shands discussed the partial and complete removal of cartilages and the use of the Bostwell incision. It has been reported in one clinic that, regardless of the type of operation, 20% of the patients still have a positive Mc Murray sign for posterior joint derangement.

DR. ARTHUR KRIDA expressed an opinion that people suffering cruciate and other ligamentous injuries are usually able to continue their chosen profession, but those with pronounced instability have the alternative of permanent brace-wearing or having the joint arthrodesed. Dr. Krida feels that joint motion will return without being forced. He does not use plaster of Paris to immobilize the knee, but prefers only partial immobilization of an extensive sheet-wadding and muslin or flannel bandage. If convalescence is accompanied by effusion into the joint during bed-rest period, there is no benefit in getting the patient out of bed until the effusion subsides.

This paper was further and extensively discussed by Colonel Shands (Air Surgeon's Office), Major Campbell (Dow Field, Maine), Major Baird (Fort Devens, Mass.), Major Glock (Mitchel Field, N.Y.) Lt. Leinbach (Tampa, Fla.), and closed by Dr. Krida.

CHRCNIC LOW BACK PAIN
TREATMENT AND DISPCSITION
(IN THE MILITARY SERVICE
BY

L T. COLONEL ALEXANDER MILLER, M.C.

L T. COLONEL ALEXANDER MILLER, M.C. (Tilton Hospital, Fort Dix, N.J.) Cases of acute back strain respond very well to taping, physiotherapy in the form of heat and light, sedative massage, and a short period of release from the more strenuous duties. In the presence of muscle spasm, list and positive leg signs absolute best rest on fracture boards is added and occasionally traction is applied. Novocaine injections are occasionally used if trigger-points are present. The prognosis for return to full duty within four to six weeks is excellent.

The disposition of chronic cases was reviewed according to the pathological condition found. Fractures of the bodies and transverse processes of the lumbar spine were returned to full duty after an average of five or six months' treatment in 81% of the cases. Fifteen of eighteen cases operated upon for herniation of the nucleus pulposus were returned to duty, but two of these were known to have been hospitalized since. Emphasis was placed on neuropsychiatric clearance prior to operation.

In hypertrophic arthritis of the spine where a higher age group with higher aptitudes, skills and experience is found, physical therapy, supports, and correction of obesity were used, but special consideration was given to careful classification and assignment. In infectious arthritis the same treatment was used as in the hypertrophic form, but in addition, more emphasis was placed on elimination of foci, special diets supplemented with vitamins and artificial fever therapy, with preference on typhoid vaccine used intravenously.

Three cases of tuberculosis of the spine were fused and then discharged from the Service.

Deformities of the spines such as spondylolisthesis, wedging of vertebral bodies, rotation of facets, spina bifida, sacralization, and lumbarization were usually returned to duty after conservative therapy including supports.

Of 108 patients with chronic back strain 45% were returned to duty. Treatment of these cases included study of body mechanics, foot posture, abdominal musculature, and respiration. Manipulations, with and without anesthesia, novocaine injections to tender points, supports, bed rest, traction, and elimination of foci were employed. Neuroses and personality defects are frequently masked in chronic low back pain. Thirty per cent of the 108 patients with chronic low back strain were discharged from the Service with a primary or secondary diagnosis of psychoneurosis. These cases should be assigned to duties which they can perform and should not be given lengthy assignments to menial tasks. Effective convalescent programs should salvage many of these cases.

DISCUSSION

LT. COLONEL ALFRED R. SHANDS, JR. (Air Surgeon's Office) stated that a good policy for a small Station Hospital was to C.D.D. cases that are L.O.D. No., EPTI if no improvement occurred in three weeks. If L.O.D. Yes, after three weeks of conservative treatment without improvement transfer to a general hospital should be done. He emphasized that men with special qualifications should be put on the right job.

MAJOR NOLAN H. BAIRD (Fort Devens, Mass.) suggested that closer cooperation with the Commanding Officers was necessary so that the right assignment be obtained.

L.T. COMMANDER TOOHEY (St. Albans, New York) stated that, in the Navy, rest treatment was used followed by short plaster jackets which was good treatment for the cases having real pain and usually broke down the other cases so that they wished to go back to duty. Cooperation with a psychiatrist, he thought, was very important.

L.T. COLONEL ALEXANDER MILLER (Fort Dix, N.J.) in closing, emphasized that special exercises and rest are the best things to get the chronic low back case back to duty.

AMPUTATIONS
BY
DR. PHILIP WILSON

DR. PHILIP WILSON (Director of Hospital for Ruptured and Crippled, N.Y.C.) In lieu of reading a paper, Dr. Wilson showed moving pictures of the operative procedures of several common amputations of the leg. He first demonstrated a Pirogoff amputation, using the sawed end of the oscalcis as a weight bearing surface brought up to the levelled off end of the tibia. The next operation demonstrated was a guillotine amputation below the knee leaving long skin flaps. The third amputation, guillotine above the knee, was next demonstrated again leaving long skin flaps. He emphasized the early use of traction applied to the skin flaps to allow for wound seepage and drainage. The skin flaps at first looked overly long, but as healing takes place they fit the stump snugly. He emphasized that this guillotine flap amputation with early traction was the method of choice in traumatic battle casualties, or in accidents at fixed installations within the United States.

DISCUSSION

COLONEL KOENIG (Surg. Consultant, Second Service Command) Colonel Shands and Major Carpenter referred to cases of gas gangrene and gas bacillus infections which are beginning to make themselves evident. He asked how many cases coming from overseas with gas bacillus infection had been operated on. The answer is - very few. Prior to invasion of Sicily, little gas bacillus infection found, because of the character of the terrain. Twenty-five years ago in Belgium, one recalls quite definitely that where the soil was devoted to agriculture, very little gas bacillus infection occurred, but, when the Army went through the grazing areas, up went the

incidence of infection. As we go up the Italian mainland in this war, we may see the same number of amputations necessary. The first guillotine amputations were done by the French. Colonel Koenig at first thought they were brutal. But, in a very short time, we found they were right and we were doing plenty of them later. Immediate open guillotine amputation obliterates all anaerobic infections.

DR. PHILIP WILSON (New York City) again stressed the early application of traction. Used to make traction by using two Buck's extension (two basswood splints). Also have to be careful not to strip off the periosteum, in which case you get a collar sequestrum. It is comparatively rare that one has to do a secondary amputation, if not too much scar tissue. Apply immediate traction. For about two weeks the flap is way beyond the bone, but contracts well. He hopes that debridement will not be done to a lesser extent, because we have the sulfa drugs. A conservative debridement may be done, if one has an ordinary infection. However, if one goes abroad and sees a soldier who has been shot within twelve hours who has crepitation above knee, one has to be radical. On the other hand, if one sees a man with a high explosive wound who has been lying in the woods for a few days and the wound has the putrefied odor, one should be more conservative in dealing with Welch bacillus. The bacteria propagate along the paths of vessels. Always palpate high along the femoral joint, because, while there may be no gross crepitation or infection below, watch out for crepitation or infection higher up.

LT. COLONEL ALEXANDER MILLER (Fort Dix, N.J.) asked Dr. Wilson about the transportation of guillotines, how they are supposed to be trans-

ported without loosening the traction.

MAJOR GREENOUGH asked about saving as much forearm as possible for cineplastic work for later on.

CAPTAIN LEVINE asked to hear about the cineplastic work done by the Navy.

DR. PHILIP WILSON answering Colonel Koenig said that gas infection had never been a great problem in this war, until recently in Italy. Figures in last war showed that of those who reached the hospital alive, the amputation rate was very high. General Kirk's figures showed that the casualty rate in North Africa was low. Amputation rate was also markedly reduced. Even with the increasing number of casualties to those in the last war, relative number of amputations lower. In the end, the figure will run up somewhat with a good many boys coming back home with hopelessly maimed feet, who will be better off with amputation. The surgeon on the field feels that the foot should be saved. He said that Colonel Miller mentioned the transportation of these guillotine cases - that in the last war it was found perfectly possible to transport these cases with Thomas Splints, with span windlass traction, with counter-traction against the ischium. If the ring were not too large, there would be no difficulty about this at all. The stump should be bandaged with the splint and even the plaster of Paris bandage that is being used in the femurs, in the so-called Tobruk splint, where the leg is also placed in plaster cast. About the cineplastic amputation, this always flares up from time to time. Hope it may prove to be worthwhile. He does a lot of them, some with good results. Some had skin tunnels that did not hold up. In this country very little has been done with it. One of the reasons being that it is very difficult to get a prosthesis. He, personally, believes that, excepting in the bilateral amputation, it is

not worthwhile. A man can learn to do so well without one hand that all he needs from the amputated side is passive assistance. There is a major hand and a minor hand in everything that is done, only a few things require two hands. There are a lot of amputations coming back from overseas. There are five amputation centers, which centers are fast filling up. Major problem - traction is not being used in the early treatment of these cases. Surgeons have not yet figured out that it is possible to start it - traction - and keep it up during transportation. Actually, these Army centers are going to take care of the stump. If these amputations have to be done, it is very important as to what methods the Army and Navy should use.

FRACTURES OF THE HIP, FEMUR
AND KNEE JOINT
BY

ALAN DeF. SMITH, M. D.

PROFESSOR ALAN DeF. SMITH, M.D. (College of Physicians and Surgeons, NYC). For fractures of the neck of the femur the best results are obtained by use of the Smith-Peterson nail without exposing the hip-joint. No walking should be allowed for three months and then only with crutches. If aseptic necrosis occurs, weight-bearing should be further delayed.

In the aged it is advisable to treat intertrochanteric fractures by some form of internal fixation such as the Smith-Peterson nail with an attached plate or the Moore plate with a spike for the femoral neck. In healthy young adults, such as in the military service, skeletal traction by means of a Kirschner wire inserted through the supracondylar region of the femur with the hip in slight abduction and flexion gives surprisingly good results. Four to six months in bed are necessary before walking is begun with crutches.

Simple shaft fractures of the femur are satisfactorily treated by suspension in a Thomas splint with a Pierson attachment and skeletal traction through the femur above the condyles by a Kirschner wire inserted from the medial side avoiding the suprapatellar bursa. The maximum weight should be applied at once to achieve reduction and then lessened as indicated. In fractures of the upper third of the shaft, the proximal fragment is usually flexed and abducted so that the lower fragment should assume the same position. In the middle third, gravity tends to cause posterior angulation so that the sling under the middle of the thigh must be kept taut in order to preserve the normal anterior bend of the femur. The adductors tend to draw the lower fragment to the medial

side which may be controlled by pressure pads clamped to the splint or by a sling attached to a rope passing through a pulley above and to the opposite side. In the lower third, the distal fragment is nearly always angulated posteriorly by the action of the gastrocnemius which is counteracted by flexing the knee. Frequent check by x-ray is necessary every few days until the desired position is obtained, and then every two or three weeks until the callus is very firm. Walking should not be allowed until the fourth to sixth month, and then only with a caliper, Thomas splint, or crutches. The splint should be worn until the end of one year.

In a number of cases simple traction and suspension will not result in a satisfactory reduction and maintenance. Transverse fractures, interposition of muscle, and comminuted fractures with a large intermediate fragment are of this category. Double pin transfixion in the Roger Anderson type of apparatus may be used for the transverse fracture which can be reduced but which will not stay in place. Open reduction and plating are necessary for muscle interposition and may be used for the transverse type.

Compound fractures of the shaft are best treated by debridement, reduction, insertion of pins and fixation in plaster. It is here the Roger Anderson or similar apparatus is most valuable.

Fractures of the knee joint demand very accurate and exact reduction if function is to be preserved. In many cases open reduction and internal fixation are necessary. Fractures of one or both condyles should be fixed with screws or bolts after restoration of anatomical

position. Fractures of the tibial condyles into the joint are similarly treated. Depression of one of the tibial condyles may be corrected by prying up the depressed bone through an incision outside the joint and inserting a wedge or block of bone beneath it to hold it in place. Any associated meniscal damage should be operated upon only after the fracture has healed. Fractures of the patella with displacement should be sutured with material strong enough to permit early motion repairing the tear in the quadriceps aponeurosis. Hemarthrosis should be evacuated.

DISCUSSION

CAPTAIN THOMPSON (Atlantic City, N.J.) stated the fractured femurs have a tendency to slip in transportation. He stressed the need for close supervision after apparatus is removed to see that exercises are properly performed. Cases that he had seen following excision of the patella for fracture showed loss of complete extension.

COLONEL LASHER (West Point, N.Y.) advised extension of the small fragments in fracture of the patella.

LT. COMMANDER TOOMEY (St. Albans Naval Hospital, St. Albans, N.Y.) stated that the Navy had lost some of the initial enthusiasm over the Stader splint but stated it was excellent for the neglected compound fracture.

DR. SMITH (Columbia University, N.Y.) stated that he avoided total excision of the patella. In the old fractures of the femoral neck with a lot of absorption he prefers the McMurray osteotomy. He believed that after a dislocation of the hip the patient should not walk before

four or six months without support because of the danger of aseptic necrosis of the head.

"TREATMENT OF BURNS
BY
MAJOR STUART Z. HAWKES

MAJOR STUART Z. HAWKES (AAF Convalescent Center & Regional Station Hospital, Mitchel Field, New York) stated that in modern warfare burns have become a large part of our casualties. In the North African desert campaign the British Army suffered far more burn casualties from the misuse of inflammable agents than from enemy action. As the result of enemy action (50% of our casualties at Pearl Harbor were due to burns) occasional mechanical imperfections, unavoidable accidents, and plain lack of common sense, we are seeing a higher percentage of burns in the armed forces than in any previous period.

Sterility of treatment is basic for good results. The first person treating the burn often determines the length of convalescence by his observance of asepsis. This includes the wearing of sterile gowns and a cap and mask covering the nose when possible. The burned patient must be protected from the nasopharyngeal organisms of attendants in much the same way as Semmelweiss protected parturient women from childbed fever, by pointing his finger at the doctor as the carrier. PAIN - It is becoming more apparent that the routine administration of large doses of morphine to shocked patients is not to their best advantage. This is especially true with burns of the respiratory tract and with the type of shock seen, hemoconcentration with concurrent anoxia. It has also been shown that the analgesic action of morphine increases rapidly up to 1/6 gr. but is increased little by doubling or tripling the

dose. Repeated small doses give better results without causing the marked depressant effect on the heart and respiration of one massive dose. The Army is recognizing this fact in the new syrettes which contain 1/3 gr. of morphine. SHOCK - As has been said, this is the type with low blood pressure, hemo-concentration due to plasma loss, and diminished circulating blood volume. It has been estimated that the circulating volume is often only 40% and the cardiac output only 33% of normal. With the diminished circulatory flow there is marked anoxia.

Berkow's formula is a very simple outline to follow in determining the amount of plasma to give in 24 hours. Using the estimation of burned surface as a guide, we give 100 cc. of plasma for every percent of burned body surface. The first units may be run in very rapidly, and then the speed of the intravenous therapy diminished. Serum albumen, a 25 gm. ampoule, which is diluted with 100 cc. of sterile water should be used with caution. Each gram will draw 20 cc. of fluid from the tissues and, therefore, it amounts to 600 cc. of intravenous fluids. The fluid drawn into the circulation rapidly at times gives a sharp blood pressure rise, and thus may increase pulmonary edema or cardiac complications in the presence of a weak myocardium. Its administration should be followed by plasma or glucose in sterile water given very slowly to combat tissue dehydration. If hematocrit determinations are available, 100 cc. of plasma is administered for each point above 50. The total fluids excreted in 24 hours should be at least 1500 cc. and 2500 to 3000 cc. of intravenous fluids are usually minimal requirements to obtain this output. GIVE OXYGEN - The administration of oxygen is most important to combat the shock and the anoxia. Much of the restlessness, .

apparent pain, and the anxiety can be alleviated by oxygen, all symptoms of superimposed cerebral anoxia. TETANUS TOXOID should be given to all patients with second and third degree burns. CHEMOTHERAPY An initial dose of 4 gm. of sulfadiazine is given by mouth. 1/2 gm. is then administered every four hours until the urinary output reaches 1500 cc., when the dose is increased to 1 gm. Q.4.H. No local chemotherapy is used except in minor burns. Minor burns are those involving less than 5% of the body surface, and not involving the hands, face, or flexion creases.

The emergency and the hospital treatment of the burned area should be the same. 1. Avoid contamination - masks, gowns, and aseptic technique when possible. 2. No debridement or breaking of blebs except when grossly contaminated. Then only be gently cleansing with cotton swabs and sterile water or bland soap and water. 3. Apply sterile petrolatum or boric acid ointment. 4. Cover with fine gauze mesh dressing, then cotton wadding, and finally pressure gauze bandages or elastic bandages. 6. Encase all of the part distal to the burn in the dressing to prevent edema. 7. The part may be immobilized by applying a plaster cast. Such treatment may be necessary due to associated injury; however, in any case, it produces relief of pain, circulatory slowing, retardation of lymph flow, and reduces contamination with subsequent infection. Be sure to split the cast. Many cases returning from abroad have been so treated and when the casts were removed after reaching this country, 10 days to two weeks later, the burns have been found healed, or well on the road to uncomplicated recovery. Whether casted or not, infrequent dressings are indicated

leaving the original dressing on for 10 to 12 days.

The primary treatment of third degree burns may well be excision and primary skin graft, the patient's condition permitting. It is well to be careful, however, that the burn is not of the deep second degree type which often simulates a deeper burn at first. In these cases, regeneration will occur from epithelial cells remaining in the deep-lying hair follicles.

Recently a very interesting day was spent in the Merck plant at Rahway, N.J.. The medical director demonstrated several burns treated by initial criomotherapy. This consisted of immersion of the extremity or covering the part with solution maintained at 15° centigrade from one hour to 1-1/2 hours. The part was then covered with cold packs of 3% sodium-thiosulphate for 24 hours. Petroleum pressure dressings were only then applied. The advantages of this method are:

1. Relieves pain almost immediately.
2. Lymph flow stops at 15° C., thus reducing lymphorrhea.
3. Lowers the metabolic rate.
4. Produces circulatory slowing.
5. Diminishes dissociation of oxyhemoglobin.
6. Has a bacteriostatic effect.
7. Localizes any septic process.

DISCUSSION.

LT. COLONEL WALTER D. WISE (Surgical Consultant, Third Service Command, Baltimore, Md.) stated that he intended to talk on the subject of burns from the standpoint of a rather long period of observation and many changes that he had seen and now Major Hawkes with Colonel Churchill have widened the scope. The cold treatment discussed is new to him and he thinks possibly has great potentialities. The observations so

far have not mentioned the beneficial effects that cold might have in the prevention of shock. This is contrary to former teaching where heat was used to combat shock and, as has been shown by Blalock and others, probably did patients great harm. In the films Major Hawks showed the burns were localized to a limited area. It may have been that the treatment helped the burn and the pain, but also possibly prevented plasma disturbances. This opens up an interesting field. Those in the Medical Corps of the Army have a treatment of burns outlined for them but no guarantee that it will stay that way - the changes have been so rapid for the past few years. The changes in treatment of burns show that they have not found the full answer yet. There has been great improvement in the prevention and treatment of shock and sepsis and also in the institution of early skin grafting and plastic surgery. Still there is much confusion in the profession at large, as to local treatment - dry treatment, wet treatment, dry and open dressing, coagulants and ointments and no ointments, plain ointments and aseptic ointments, pressure dressings with allowance for drainage and allowance for drainage without pressure; the use of tannic acid and silver nitrate with or without pressure dressing, free use of sulfonamides in picric solution and fear of application of sulfonamides. To some, radical debridement means debridement par excellence. He wondered whether temperatures are not kept too high in heat cradles and cause loss of plasma within and without the tissues. With the enthusiasm for plasma, fluids and carbohydrates are often neglected. He wondered whether more glucose should not be used for the benefit of the liver and kidneys. He said what is needed is an authoritative order coming from the concerted opinion of

the Armed Forces and civilians. Minimal debridement and pressure dressings are the accepted treatment at the present time, however, some new modifications, as outlined tonight, may be added.

CAPTAIN EDWARD J. COUGHLIN, JR. (Grenier Field, N.H.) Had a case where a P-40 turned over; the flyer was caught inside by a safety belt. The patient had about 75% of his body burned to a char, obviously a hopeless case. A 1/4 gr. of morphine did not help him. He was in terrific pain. They tried refrigeration as used in extensive crush injuries, using snow as it was in the winter time. The pilot lived for five days in perfect comfort. At autopsy the deep tissues looked perfectly normal, although the skin was leatherized.

MAJOR ARTHUR A. THIBODEAU (Lovell General Hospital, Fort Devens, Mass.) Asked about the plaster cast method of treating burns. The Army should think seriously of what Lunn has shown. The secret of treatment, especially on extremities, is that the whole extremity should be included. The cast must be skin tight, and, at least 4 inches above the area burned. Burns of the hand are put in a neutral position. Clean very lightly (do not break the blebs) with absorbent cotton and alcohol, sponge off, cover with 5% sulfathiazole vaseline gauze and sprinkle sulfonamide on. Cover with 4 x 8 dressing, thin layer, and then a cast. This method keeps the circulation going and yet raises the pressure of the lymph up to the blood pressure, so that lymph weeping is minimized. This fact has been proven by cannulas under the cast. No pain is felt, no sedative needed. These men can also be evacuated more effectively.

LIEUTENANT IRWIN S. LEINBACH (Drew Field, Florida) Stated that skin tight plaster is good for anyone who knows how to use it. Trueta in England is applying skin tight

plaster for treatment of burns, but not bivalving it. He always covered the limb entirely. Lieutenant Leinbach has seen cases of bad burns, on a British cruiser; all they had was Salona plaster, quick drying, which takes the shape of the limb beautifully.

MAJOR STUART Z. HAWKES (Mitchel Field, N.Y.) You can leave the cast unsplit if the case is not to be transported and can be watched. Statistics on Air Force men, evacuated by air from Africa, show they were transported in split casts wrapped tightly with adhesive tape. With only two nurses and one medical technician on the plane, it would not be well to leave the casts skin tight without splitting them.

FRACTURES OF THE FOOT AND TOES

BY

CAPTAIN ROGER J. DUGAN

CAPTAIN ROGER J. DUGAN (Station Hospital, Presque Isle, Maine) reviewed fractures of the bones of the foot. Individual types of fractures were discussed in detail as to the principal forces producing the common types, their peculiarities, characteristic deformities, and the highlights of treatment.

First, he discussed fractures of the talus. He called attention to the fact that fractures of the posterior tubercle are often confused with the os trigonum, and when it does occur, is treated by a plaster boot for four weeks. He believes fractures of the body should be immobilized in plaster six to eight weeks and that fractures of the neck should be immobilized in plaster and weight-bearing prohibited for ten to twelve weeks. He stresses accurate reduction and restoring normal articular facets. He discussed Bohler methods of treatment and the use of non-padded plaster walking casts where the displacement of fragments of the neck of the talus is great it may be necessary to resort to open reduction.

He mentions the fact that more severe injuries may later necessitate arthrodesis but states that astragalectomy is to be avoided. Sub-talar dislocations, if reduced early, have a good prognosis.

Fractures of the navicular must be distinguished from accessory navicular ossicles. These fragments usually are not displaced but open reduction may occasionally be necessary and arthrodesis for late painful after-effects is sometimes indicated.

Fractures of the cuboid and cuneiform are immobilized four to six weeks and subsequently treated with arch supports. Dislocation of the tarso-metatarsal joint requires immediate reduction and immobilization for four to five weeks.

Captain Dugan emphasizes the importance of careful accurate reduction of the fractures of the metatarsal bones and immobilizes them in plaster four to six weeks and believes early weight-bearing should be avoided. It is his opinion that healing requires eight weeks and may take as long as six months. March fractures are mentioned briefly and not regarded as a serious problem; they may be treated by well-moulded walking plaster four to six weeks.

Fractures of the os calcis usually caused by a fall on the heels, may be caused by bomb concussion of the ground and decks of ships. X-ray studies of both os calcis are necessary for comparison, and view of the spine for concomitant fractures; antero-posterior, lateral, oblique, and "long" view of the os calcis are necessary.

Avulsion fractures of the tuberosity of the os calcis are not a compression type but are really traction tears. These are treated by plantar flexion and cast, or open reduction and fixation, and require five to eight weeks to heal.

For fractures of the os calcis, Captain Dugan discussed Bohler's and Yoerg's methods of treatment in minute detail.

DISCUSSION.

CAPTAIN SAMUEL E. BECHTOLD (Rome, N.Y.) gave his experience at an Army Air Depot where the personnel was composed nearly entirely of civilian workers. His chief concern was absenteeism and the chief problem was the early return of employees to work. In 1943 they had two employees suffer

fractures of the bones of the foot, one losing 90 days' work, and the other 83 days. Both fell from aeroplanes onto their heels. He observed a series of 61 fractures of the toes, 34 of which were caused by falling objects. These were treated with novocaine, strapping with adhesive tape, analgesics, without hospitalization for an average time loss of 2.3 man hours.

In his experience March fractures were best treated by strapping the toe distal to the fracture to the adjacent toe, strapping a large felt pad on the plantar surface and immediate weight-bearing.

COLONEL LASHER (West Point, N.Y.) COLONEL MILLER (Fort Dix, N.J.) MAJOR COMBS and LIEUTENANT LEINBACH discussed the occurrence of "March Fractures" of metatarsals, tibia, fibula, femur, and pubic rami.

COLONEL ALEXANDER MILLER (Fort Dix, N.J.) has seen many returning soldiers with very severe compounded infected fractures of the forefoot but urges conservatism, particularly when the 1st metatarsal bone remains. Only one of these cases came to amputation.

MAJOR SPENCER T. SNEDECOR (Phoenixville, Pa.) discussed the problem of morbidity attending fractures of the os calcis. He believes that soldiers return to duty in 25% less time than civilians return to work, following their fractures. In his experience these fractures are practically all overlooked in combat areas.

MAJOR WAYNE R. GLOCK (Mitchel Field, N.Y.) called attention to the increasing frequency

of the "Rudder-Bar" fractures of the talus, and the subsequent aseptic necrosis necessitating reconstructive surgery. In regard to fractures of the os calcis, he prefers to use Hermann's method of treatment.

MAJOR ARTHUR A. THIBODEAU (Fort Devens, Mass.) presented the Hermann method of redressment of the fractured os calcis and method of casting in minute detail.

MAJOR HAWKS and LIEUTENANT LEINBACH discussed Bohler treatment; in their experience both returned to duty.

This paper was completely discussed in detail by COLONEL ALFRED R. SHANDS (Orlando, Florida) and closed by CAPTAIN DUGAN.

A CONVALESCENT REHABILITATION PROGRAM
FOR THE ORTHOPEDIC PATIENT

BY

LT. COLONEL ALFRED R. SHANDS, JR.

LT. COLONEL ALFRED R. SHANDS, JR., (Air Surgeon's Office) feels that Rehabilitation is one of the best things for boys in the hospital. A soldier coming into the hospital, particularly the orthopedic patient, should be met by a Rehabilitation Officer and told that he is coming into the hospital for medical care and to be a student in the program for Rehabilitation which will result in getting him back to duty at the earliest possible moment. If this is made clear to him by the Rehabilitation Officer, the program will work more smoothly. In the past the idea has been that the soldier was going into the hospital to rest. The soldier should be told otherwise. Also he should be told that his work will be graded, and this will be put in his permanent record counting toward all promotion. With that understanding, the patient is admitted to the Orthopedic ward. The Medical Officer should at once evaluate his physical disability and outline what he should do and start him in the program at once. If it is a knee case, or a definite cartilage injury, the soldier should be started on quadriceps exercises. Then a record should be kept on his chart as to what this soldier does.

The Rehabilitation Program is divided into two parts - physical and mental. Physical: A- Calisthenics, drill, athletics, and special exercises. B - Physiotherapy, which should include occupational therapy. C- Work therapy, which is most important to the patient next to physical therapy. In the past there has not been enough emphasis put on this part of the program. He wants them to emphasize this phase in all station hospitals.

Around the hospitals there is a certain amount of ward work. All possibilities should be explored, the carpenter signed to the carpenter shop, electrician to the electrical shop, plumber to the plumbing shop, etc. Lt. Colonel Shands said he would not discuss the mental portion of the program.

Vocational training of soldiers at this time has been turned over to the Veterans Administration and State Rehabilitation Departments. There will come a time when this will start in the general hospitals while the soldier is getting well. When in the hospital the patient should be thinking in terms of what job he can hold when he gets out of the hospital.

An important problem right now is the job classification of the soldier. If the patient is in a job he cannot do, the Reclassification Officer should be called in. In Orlando they have a man assigned to the hospital, an officer on call at all times to come in and interview soldiers to place them in the right jobs.

Any kind of program of this character will bog down if there is lack of enthusiasm. The Air Force Hospitals have as a rule a group of directors of these programs that are comparable to any; they have enthusiasm.

This Rehabilitation Program will be one of the great things of the future and it is his opinion that eventually it will be introduced into all hospitals in this country.

DISCUSSION

THE PROGRAM OF REHABILITATION AT MITCHEL FIELD.

LT. GEORGE C. BARGER (Mitchel Field, N.Y.)
In the development of the Convalescent

Training program at Mitchel Field, we have endeavored to keep three things in mind:

First: The welfare of the patient and the development of his physical well-being from the standpoint of personnel who are not all doctors, and who are not all well-versed in physical education.

Second: To seek and develop the co-operation of every member of the hospital staff in order to return a patient to duty with a shorter period of hospitalization than had heretofore been the practice, and to return a patient to duty in better physical condition than he would have been. This means that upon the arrival of that patient at his organization, he must be physically capable of full participation in organizational activities.

Third: It is constantly remembered that nothing be done for, or to the patient that does not contribute to his physical or mental well-being.

The second of these is paramount in the stage of development and the other two are paramount for the successful operation of the program.

The operation of the program should be guided by the Convalescent Training Officer, but the secret to the success of that program is the ability and the willingness of the Commanding Officer, the Ward Surgeon, the Nurse and the ward attendant to recognize his or her individual responsibility and carry it out. The enthusiasm of the Commanding Officer is of tremendous importance. The interest of the Ward Surgeon to properly classify his patients into one of the three classes, also can easily spell

success or failure. He classifies this man under a red card, which means he receives no physical training, but can participate in group discussion, listen to lectures and attend training film classes. He marks that man with a yellow card; he can do moderate exercise and participate in all other activities. The marking with a green card is a "go ahead" signal for him to receive normal calisthenics and such special exercises as is deemed necessary and also participate in all other activities. He is said to be a well man and will soon be ready for full military duty.

We do not attempt to chase the patient out of the hospital to make a "shining" report for Washington each month, but are endeavoring to fully rehabilitate the man, basing the decision on the knowledge of the Ward Surgeon.

A CONVALESCENT REHABILITATION PROGRAM FOR THE CRTHCPECIC PATIENT

Convalescent training begins as soon as the patient is admitted to the hospital. The loss of only one or two days may allow the man's muscular ability to retard to the extent that it may cause him to return to duty in a weaker condition than he would have been, but also will cause him to remain a patient one or two days longer. One might say that one or two more days rest in the hospital would do him good. But the average period of hospitalization at Mitchel Field is said to be roughly - ten days. The average hospital census for the past six months has been 324 enlisted men, which means a total average of 1940 enlisted men admitted in the past six months; deducting from that figure, the present census of 324 enlisted men, we have

a balance of 1616 enlisted men admitted and discharged from May 1st to November 1st. If we are successful in salvaging only one duty day per man, we have saved 1616 days, approximately 65 work weeks, or one year and three months service for one soldier.

The nurse also plays a leading role, not only as an assistant to the Ward Surgeon, but she is responsible for seeing that the convalescent's training schedule is complied with. When patients are scheduled to be at a designated class at a given time, she does not permit them to lie on their bunks or entertain themselves in the ward. She changes the classification of patients as directed by the Surgeon. In many cases, the nurses have participated in moderate exercises with the patients; this not only gives the nurse physical benefit, but also has a tremendous influence on the patient's willingness to participate.

A great deal also depends on the ward attendant; second to the Ward Surgeon, the ward attendant knows his patients best. He knows the person to which these activities can be applied with little or no explanation. He also knows which of his patients are capable of assisting with the program. He is better in a position to lead the patients in group or individual exercises. These exercises should be given both in the morning and in the afternoon. Due to his constant contact with the patients, he is in an ideal position to sell the program to each and every patient. The greater understanding a soldier has of what is expected of him, the greater his success.

The patient is the student, and in many cases, the instructor. It has been found that group discussion is the greatest source of

learning among men who are of varied mental capacities. But even group discussion must have a leader and there must be a good reason why one patient should lead others. Selection of a patient to lead a discussion is always based on the fact that the leader has "been there", "seen it" or for a period of time is known to have participated in the activity discussed. Thus a patient returned from overseas, who has participated in major campaigns, can always command respect and cooperation in leading any group discussion.

We do not intend to infringe on or take away any of the activities with which the Physiotherapy Department may be charged, but instead, the Convalescent Training Department may be directed by the Ward Surgeon to give special exercises to a patient in lieu of, or, in addition to that service rendered by the Physiotherapist. It is of great importance that both these departments work in closest harmony.

The remarks so far have been mostly limited to the physical development and rehabilitation of the soldier. I would now like to discuss briefly the educational phase. The success of the educational program depends on selecting the type of program best fitted to the demands of your hospitals. Most educational programs are on six to nine months basis and are said to be of long range. It, of course, is understood that the educational phase of a convalescent training program could not be of this nature. The entire program, then, must be of short range nature and should never be presented for a period of more than two days, keeping in mind the fact that one half

presented today is all that the patient gets if he is discharged tomorrow. Never more than two hours should be provided for a lecture or discussion on education and each such period completed with the minimum of carry-over. More than sixty-seven percent of what we learn is from vision. The Convalescent Training Officer should procure and maintain an unlimited supply of visual training aids. These should be in the nature of charts, pictures and scaled models. These should always be available for the patients' use as this part of the program begins as soon as the patient arrives in the hospital. It is impracticable to move large charts and picture aids from one bed to another. Special emphasis should thus be placed on the procurement and use of "bedside training aids". These can best be prepared in "table type" upon which the patient is permitted to assemble objects of an educational nature of, as an example, a frame, for tying camouflage nets. The American Museum of Natural History has gone "all out" for the development of this type of aid. They have assigned personnel and allotted money. Every agency in America has or will, if called upon, respond quickly and amply to this cause. Among such agencies are, Armed Forces Film Institute, Time Magazine (which has contributed in an astounding manner) Educational Branch, Special Service Division, Army A.F.T.A.D. (Army Air Forces Training Aids Department) in New York City.

This program, first initiated December, 1942, has spread throughout the Army Air Forces in seven months and in that short period has received loud acclaim. Every hospital in the Army Air Forces today has a program of this

nature. A total of over two and one half man hours of physical and military training is being conducted every month in the Army Air Force Hospitals. I would like to give you a few figures which have been recently released in Washington. A study was made of two groups of soldiers hospitalized for virus pneumonia. One group was given the special reconditioning program, the other was not. The group deprived of the program averaged 45 days of hospitalization with thirty per cent of the cases having a recurrence of sickness. The other group averaged only 31 days with only three per cent of the cases recurring. One hospital reports a reduction of from 15 to 11 days in patients with measles and a drop from 33 to 23 hospital days for convalescent patients convalescing from scarlet fever.

PHYSICAL THERAPY IN A SMALL
STATION HOSPITAL
BY
MAJOR COBURN A. L. CAMPBELL

MAJOR COBURN A. L. CAMPBELL (Dow Field, Me.) Physical therapy has been defined as "the application of physical agencies in the treatment of disease and injury."

Murray has said that "the amount of rehabilitation necessary is in inverse proportion to the efficiency of the primary treatment," and I would say that early and sensible, simple physical therapy should be considered as part of primary treatment.

The application of physical therapy in a Station Hospital depends not so much on complicated apparatus, but on the sound judgement and good technique in the use of that which is on hand. Lack of trained and experienced personnel reduces the type of treatment to the most simple forms, which are, however, an extremely valuable and indispensable part of orthopedic treatment. The physical therapy department is almost as important to a fracture and orthopedic service as the laboratory and x-ray departments.

Remembering the fundamental requirement of wound healing, and adequate rest, the agencies of physical therapy all of which are available in some form at a Station Hospital, will be discussed as to their physical action and how they may be applied. The major agencies are heat, massage, exercise and light.

1. Heat is useful for its local analgesic action, and for dilatation of the capillaries, thus increasing local circulation, accelerating absorption and repair and increasing nutrition of the tissues. Heat is possibly the most important physical therapy

agent that we can use in a Station Hospital with inexperienced personnel.

Dry heat may be given by hot-water bottles, electric pads, infra-red lamps, electric lamp "baker" and diathermy, if available. Obviously the latter should never be applied by untrained aides, except under direct supervision. Moist heat has advantages over dry heat because of its softening action, and also water is an excellent conductor of heat. It may be applied by compresses, tub-baths, stupes, poultices and whirl-pool baths. Contrast of alternate hot and cold water are excellent means in restoring circulatory tone by alternate dilation and contraction of the small blood vessels.

2. Massage possesses similar therapeutic values to heat, and should always be preceded by heat in some form. It also improves circulation, aids in healing, and nutrition. All massage should begin as a gentle stroking type - never producing pain. It is said that after massage you do not have the alkalosis of heat, nor the acidosis of active exercise, and that there is an increase in the red blood cells and hemoglobin of the general circulation if the massage is extensive enough. Gentle heat, gentle massage followed again by heat is excellent for the reduction of localized edema - in sprains and dislocations - after the acute stage, when cold and rest are usually indicated.

3. Exercise may be of many forms from the so called voluntary "setting" of muscles to active and passive exercises and electrical stimulation, the latter used to maintain muscle-tone in peripheral nerve injuries. In a Station Hospital guided active exercise and muscle setting are the most used and practical. By guided exer-

cise we mean that each individual should have a specified schedule to follow, such as in post-operative knee cases. Patients of this type stand by their beds every hour, on the hour, and "set" and relax their quadriceps for five minutes. Active exercise in the upper extremity is best administered in the form of some type of occupational therapy. Exercise of extremities when given under water helps to relieve strain and muscle spasm, and the weakness is aided by the buoyancy of the water. Passive exercise in station hospital has very little application, unless we are fortunate enough to have an experienced physiotherapist, and even then it is not often recommended. The same applied to electrical stimulation, which requires time, experience and equipment usually not available in a station hospital.

4. Light - the best source, of course, is sunlight. Ultraviolet light has been greatly over-rated, at times, having been credited as a cure for all types of diseases. Its use is probably limited and unless administered with care, may cause severe tissue damage.

In the application of these four major agencies of physical therapy in a Station Hospital, it is not necessary to go to an extreme in apparatus. "Bakers" may be easily constructed by your electrician. I would refer you to the Army Medical Bulletin, No. 69 October 1942, in which was reprinted the Manual of Physical Therapy with diagrams for the construction of simple bakers, a simple whirlpool bath, exercise ladders, massage tables, exercise steps and other apparatus that could be easily constructed at any Station Hospital.

DISCUSSION (CPEN)

LT. COLONEL ALFRED R. SHANDS, JR. (Air Surgeon's Office) stated that he was responsible for this subject being on the program. Major Campbell's statements on home-made physical therapy equipment are good.

There has been a good deal wrong in the planning for physiotherapy personnel for the Station Hospital. He does not know whether the General Hospitals have enough trained personnel to go around. The Air Surgeon's office has a program now suggested, but it has yet to be approved for the training of enlisted personnel in physiotherapy. Some Army Air Force physiotherapy buildings are completely equipped now ready to operate, but nothing is being done with them because of lack of personnel. It is hoped that this program may be able to supply the small Station Hospitals with personnel. The Surgeon General's Office has promised to meet the demand for physiotherapy technicians as quickly as possible. However, it takes 6 to 9 months to fully train a technician and students are lacking. Recruiting from the WACs is now being done. Five or six Army schools of physical therapy are running with twenty civilian schools.

MAJOR STUART Z. HAWKES (Mitchel Field, N.Y.) says that the physiotherapy equipment at Mitchel Field is converted equipment. Thermostats, tubs for whirlpool baths. Diathermy interfered with the radio transmission at Mitchel Field, also a surgical diathermy machine. A detection truck rolled up and stayed around for three weeks. It interfered with radio reception. They were ordered to stop using the machine entirely and permanently. They finally got it back to commission with line filters. They had it closed over with triple line of

copper screening (covered the short wave diathermy). Under these circumstances there was no interference with radio reception.

LIEUTENANT IRWIN S. LEINBACH (Drew Field, Fla.) In England they are very interested in physiotherapy and occupational therapy. Rounds are made with the physiotherapist. They have already started teaching enlisted men there. There is no respect from the physiotherapist unless you can teach them.

FRACTURES OF SPINE AND PELVIS

BY

MAJOR ARTHUR A. THIBODEAU

MAJOR ARTHUR A. THIBODEAU (Cushing General Hospital, Framingham, Mass.) Fractures of the cervical spine usually present a very painful and stiff neck, exacerbated by attempts to manipulate it, tenderness over the involved area, and lateral tenderness because of muscle spasm. Pain may be referred to the regions supplied by the nerve roots. Weakness or paralysis of muscles may occur due to injury to the phrenic nerve.

The usual fracture in the first cervical vertebra is through the arch, either posterior or anterior, frequently both. An x-ray should be taken through the opened mouth to obtain an antero-posterior view. Displacement is demonstrated by comparing the alignment of the articular facets of the first and second cervical vertebrae. In the second vertebra fracture of the odontoid process is most common and displacement may be lateral or anterior. In the rest of the cervical spine compression of the body is the usual type, subluxation or dislocation occasionally accompanying the fracture. In complete anterior dislocation, the articular facets may become so engaged so as to prevent reduction by ordinary treatment.

The treatment of fractures of the cervical spine is by skeletal traction, preferably by the Crutchfield tongs. Slight extension is desirable in the first and second and in compression fracture. When the articular facets are locked, extensive traction in slight flexion is necessary before attempting extension. After reduction is obtained, fixation is obtained by applying a plaster jacket from below the crest

of the ilium to include the chin and the entire occiput, and left on for three months following which a brace is worn.

Fractures of the dorsal spine are less frequent than cervical or lumbar fractures and are occasionally associated with rib or sternum fractures, especially in the upper dorsal region. The compression type of fracture is most frequent but rarely a dislocation may occur. Tenderness is present over the involved area on percussion or deep pressure, or on manipulation of the spinous process, but muscle spasm may not be marked.

Traction for cervical spine fractures with or without leg counter-traction is indicated when dislocation is present. For compression, hyperextension with fixation is necessary. An excellent method is to place the patient on a wide piece of canvas with a hole through it large enough to allow the face to protrude. From the prone position the front end of the canvas is pulled upward to a frame on to the ceiling to obtain reduction followed by the application of a cast which should include the neck and chin in the upper dorsal spine. Fixation is maintained for three months.

Fractures of the lumbar spine are most common and are accompanied by severe muscle spasm and occasionally abdominal symptoms. In dislocations or severe displacement, traction is used through the legs with the foot of the bed elevated. Extension alone is used for simple compression, and a plaster jacket is applied from the symphysis pubis to the sternal notch. After the plaster dries, the patient becomes ambulatory if there is no involvement of the pedicle or

articular facets, because one depends upon the posterior arch to maintain position. Plaster fixation is maintained for three months following which a brace is used for three to nine months. In neurological involvement laminectomy is indicated if a positive Queckenstedt Test cannot be relieved by traction and manipulation. Occasionally, even after satisfactory treatment, pain will persist due to change in alignment, mechanics, and pressure on intervertebral nerves. Laminectomy and spine fusion may then be indicated.

Fractures of the spinous processes, transverse process and articular facets are better treated as severe sprains or strains.

Fractures of the sacrum and coccyx are treated by bed rest with occasional excision of the coccyx.

Fractures of the pelvis most frequently seen are in the following order: pubic bone, either body or the rami; the rami of the ischium, symphysis; and, least frequently, dislocations of the sacro-iliac joints.

Fractures not affecting the continuity of the pelvic girdle need only fixation in a pelvic girdle. If the posterior girdle is fractured in combination with the anterior arch, suspension is carried out with a hammock plus traction, preferably by a Kirschner wire through the lower end of the femur if there is upward displacement. In the simpler types of fracture the patient should be kept in recumbency for eight weeks followed by a pelvic girdle for eight more weeks. In the severe fractures no weight-bearing is allowed for three months. If instability of the sacro-iliac joint occurs arthrodesis is indicated.

In the discussion, Lt. Colonel Hamilton,

(Westover Field, Mass.) mentioned that in bailing out a number of fractures of the wing of the ilium were being seen as the hip struck the stabilizer. He mentioned Dr. Adams of Boston who thought all dislocations of the hip should not bear weight for ten months.

CARE OF THE SOLDIER'S FEET

BY

MAJOR JOSEPH S. MULE'

MAJOR JOSEPH S. MULE' (Bradley Field, Conn.): Forty percent of the orthopedic consultations are for foot disabilities. With increased stress of Army training potential foot pathology becomes symptomatic. Strained foot is the first expression of functional decompensation of the foot to added strain. He presents considerable evidence to show that symptoms are due to an overstretching of supporting structures. In this condition the anatomical relationship of the foot is retained. The treatment consists of rest, contrast baths, adhesive dressing and felt pads for the longitudinal arch. The use of the arch-o-graph machine provides an efficient method of providing cork inserts for the shoe.

When the process of decompensation progresses to the point of disalignment of the structural relationship of the foot on weight bearing resulting condition is called weak-feet. The symptoms, instead of being local, now include pain and aching of the legs, thighs and back. The downward and inward rotation of the talus and the navicular as it rests on the relaxed calcaneo scaphoid ligament, produces a flattened arch with bulging of the inner border of the foot and pronation of the os calcis. There is tenderness about the scaphoid, plantar fascia, tibialis anticus and tibialis posticus muscles. The exciting influences are long standing, rapid growth, excessive weight, general debility and malnutrition. The treatment is essentially the same as for foot strain, with special emphasis on the supporting pad being carefully designed to lift up the scaphoid

and head of the talus thus forcing inversion of the foot. Medial raises added to the heels, and lateral raises added to the soles and exercises are of value.

Rigid flat foot or flattened foot is a further stage of foot decompensation. The foot may acquire fixed permanent structural deformity which is evident on rest as well as weight bearing. There is loss of mobility of the foot and the gait loses elasticity. The feet turn outward. Here the author prefers to use a rigid leather support. Occasionally the peroneal muscles become spastic and cause serious contractures, increasing the valgus deformity of the foot. For this spastic flat foot deformity the writer recommends correction of the deformity under anesthesia and applications of casts to maintain correction. Occasionally, lengthening of the peroneals and toe extensions may be necessary. Once the deformity is corrected the foot is treated as an ordinary pes planus. It has been his experience to discharge the very severe spastic flat foot and rigid foot cases which are not amenable to treatment.

Metatarsalgia is best treated by leather metatarsal bars, pad placed back of the metatarsal heads and relief is obtained by removing weight from the metatarsal pads.

Morton's neuralgia and the short first metatarsal syndrome were discussed as to etiology and treatment. Soldiers having pes cavus have difficulty in being fitted for shoes because of a high instep. When treatment with metatarsal bars, fitted shoes, and longitudinal supports fail to give relief they are recommended for discharge.

Moderate hallux valgus cases were treated

conservatively, but occasionally where relief was not obtained the writer preferred to use the Silver operation.

Paring of the painful corn, application of a metatarsal raise and the large toe box of the G.I. shoe generally eliminates surgery in Hammer Toe deformities.

DISCUSSION.

LIEUTENANT IRWIN S. LEINBACH (Drew Field, Tampa, Florida) discussed the different kinds of foot measuring devices incidental to fitting shoes. He has demonstrated that these are not as a whole accurate enough for all types of feet. Each device seems to be deficient. The only reliable device is the Munson last measuring device or a scale of shoe bottoms in which the soldier stands until he has a correct size. The discussant presents a number of exhibits showing all kinds of arch supports, and in all stages of construction.

Briefly, Lieutenant Leinbach concurred with Major Mule' as to post-operative and post-fracture need of arch supports and the use of arch supports and rigid shanks for the treatment of static foot deformities. He is "convinced that there should be no operations on feet in the Army".

MAJOR ARTHUR A. THIBODEAU (Fort Devens, Mass.) stated that quite often calcaneo-scaphoid coalition was overlooked in x-ray films. He is of the opinion that if these were recognized and removed, many painful cases of rigid foot could be improved.

LT. COLONEL ALFRED R. SHANDS, JR. (Air Surgeon's Office) brought out a significant relationship of foot pain to psychoneurosis. A great many soldiers who have complained of their

feet have been discharged from the Army not because of their feet but because of psycho-neurosis. It is his contention that it is not necessary to have elaborate tools to turn out arch supports.

This paper was further discussed by Lieutenant Leinbach and closed by Major Mule'.

SPLINTING AND TRANSPORTATION OF FRACTURES

BY
LIEUTENANT IRWIN S. LEINBACH, M. C.

LT. IRWIN S. LEINBACH, M.C. (Station Hospital, Drew Field, Tampa, Florida) The first aid which a fracture receives may determine the end result. First, establish a tentative diagnosis, and if there is a question, it should be treated as a fracture. Second, apply a sterile dressing to any compound fracture. Third, reduce any severe deformity by gentle traction. Fourth, treat shock. Fifth, apply splinting with four points of fixation, two above, and two below the fracture, and do not move the patient until the splint is applied. Sixth, transport with extreme care, avoid unnecessary jarring.

SIMPLE FRACTURES

The following are the methods which are recommended for the immobilization prior to transportation of simple fractures of various regions:

1. Clavicle - Figure of - 8 - bandage around the shoulders with a sling at the wrist. Stockinette is very desirable material. The bandage should be pinned where it crosses.

2. Dislocation of shoulder - Reduction by traction at 10 to 15 degrees of abduction and application of a double sling.

3. Fracture of the surgical neck of the humerus - Wrist sling, which permits traction by weight of the arm. Keep patient in sitting position.

4. Fracture of the shaft of the humerus - Pad between chest and humerus, with a double sling or Velpeau bandage. An external splint may be added. The Murray- Jones splint may cause pressure on the axillary nerves.

5. Fracture of the elbow - a. Loder splint, wire should be cut out over the front of the elbow. b. A posterior right-angle splint may be made of cardboard if nothing else is available. c. Molded plaster splint, shoulder to metacarpals. Any of these splints should be supported by a sling.

6. Fracture of the forearm and wrist - Anterior and posterior molded plaster splints or board splints supported by a sling.

7. Carpus and metacarpus - skin fitting unpadded molded plaster splints.

8. Phalanges - Roller bandage fastened beneath fingers of molded plaster splint.

9. Fracture of the neck of the femur or intertrochanteric fracture - Army traction splint with the leg in internal rotation.

10. Fracture of the shaft of the femur - Skin or skeletal traction in the Army traction splint. Skeletal traction should be by a Kirschner wire through the lower end of the tibia or by a Steinman pin through the os calcis.

11. Knee joint - Skin or skeletal traction in Army traction splint with knee bent in 20 to 30 degrees of flexion, with a long pad under the flexor surface.

12. Tibia and fibula. Ladder splint to upper third of thigh, plaster splint or circular plaster or skeletal traction. Pad heel, malleoli and head of fibula.

13. **Ankle** - ladder splint or molded plaster splint extending from toes to above knee.

14. **Os Calcis** - Ladder splint or plaster with compression bandage, well-padded under the bandage. Splints should extend from toes to knee.

15. **Metatarsus** - Molded plaster splints.

16. **Spine** - a. Dorsal and lumbar. Stretcher in hyperextension with a folded blanket under the kyphos. Plaster jacket in hyperextension is preferable. b. Cervical - Voluminous cotton collar, small pillow, or gauze roll tight around neck supporting the occiput and chin. Catheterize if paralyzed.

17. **Pelvis** - Bilateral plaster spica.

COMPOUND FRACTURES

If thorough debridement cannot be done promptly sulfanilamide crystals should be sprinkled into the wound about 0.1 gram per square inch but not over 5 grams in any one wound or 10 grams total. Four grams of sulfadiazine should be given by mouth but no more by mouth prior to the completion or definite treatment unless in the opinion of the medical officer such a procedure is indicated.

The following are the methods suggested for splinting of compound fractures.

1. **Humerus** - Plaster of Paris spica including the shoulder and extending to the hand. Molded plaster splints including the shoulder and forearm or wire splints.

2. **Elbow** - Molded plaster splints or ladder splints with wrist sling.

3. **Forearm** - Molded plaster splints of sugar-tong type or wooden splints wider than the forearm, plus a sling.

4. **Femur** - a. Traction in Army traction splint with skeletal or skin traction. b. Plaster spica from lower ribs to toes.

5. **Knee** - Army leg splint with 15 degrees flexion at the knee by a broad pad from the mid-thigh to the middle of the calf.

6. **Tibia and Fibula** - a. Molded plaster splints from the upper thigh to the toes. b. Army leg splint with skeletal or skin traction.

7. **Ankle** - a. Plaster splint. b. Ladder splint. c. Compression bandage over voluminous dressing.

8. **Os calcis** - a. Plaster splint. b. Ladder splint. c. Compression over large dressing minimizes swelling and bleb formation and reduces bleeding.

9. **Foot** - Compression bandage with large dressing or plaster mold.

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